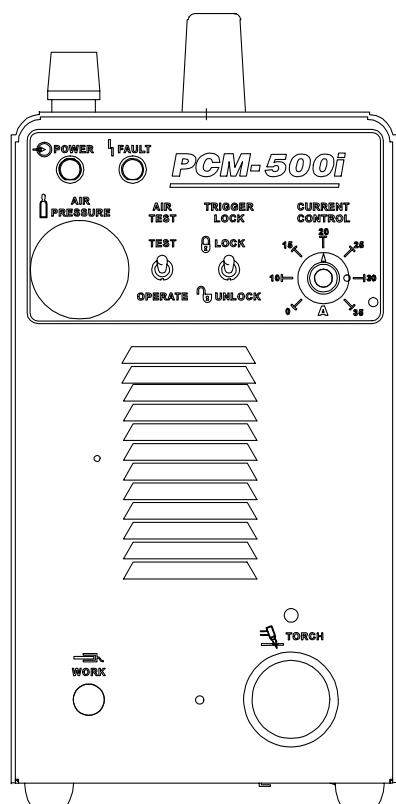


# ***PCM-500i***



## **PLASMA CUTTING CONSOLE/POWER SOURCES**

with CE Compliances  
220 V, 50 Hz, 1-Phase  
220 V, 50 Hz, 3-Phase  
400 V, 50 Hz, 3-Phase

### **Service Manual**



## WARNING



**ARC WELDING AND CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.**

**ELECTRIC SHOCK - Can kill**

- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from earth and the workpiece.
- Ensure your working stance is safe.

**FUMES AND GASES - Can be dangerous to health**

- Keep your head out of the fumes
- Use ventilation, extraction at the arc, or both, to keep fumes and gases from your breathing zone and the general area.

**ARC RAYS - Can injure eyes and burn skin.**

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

**FIRE HAZARD**

- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.

**NOISE - Excessive noise can damage hearing**

- Protect your ears. Use ear defenders or other hearing protection
- Warn bystanders of the risk.

**MALFUNCTION - Call for expert assistance in the event of malfunction.**

**READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.**

**PROTECT YOURSELF AND OTHERS!**

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## TABLE OF CONTENTS

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SECTION 1	SPECIFICATIONS .....	3
SECTION 2	MAINTENANCE .....	4
	General, Inspection & Cleaning, Flow Switch	
SECTION 3	TROUBLESHOOTING .....	5
	Troubleshooting, Trouble Shooting Guide, Sequence of Operation, Schematic and Wire Diagrams	
SECTION 4	REPLACEMENT PARTS .....	22



### CAUTION

Maintenance and Repair work should be performed by an experienced person, and electrical work only by a trained electrician. Do not permit untrained persons to inspect, clean, or repair equipment. Use only recommended replacement parts.

For installation and operation instructions, see 558000-879 (F-15-417).

Table 1-1. PCM-500i Specifications

Rated Output	40% Duty Cycle*		35 A @ 120 V dc
	60% Duty Cycle*		30 A @ 120 V dc
	100% Duty Cycle*		22 A @ 120 V dc
Output Current Range			10 to 35 Amperes
Open Circuit Voltage			265 V dc Nominal
Rated Primary Input @ 35 A @ 120 VDC Output	200 VAC, 1-Phase 220 VAC, 3-Phase		30/25 A, 50/60 Hz 14 A/Phase, 50/60 Hz
	380/415 VAC, 3-Phase		8/7.5 A/Phase, 50/60 Hz
Power Factor @ 35 Amperes Output			81% (1-Phase)/94% (3-Phase)
Efficiency @ 35 Amperes Output			90% (Typical)
Current Capacity	PT-31XL		50 A DCSP
Air Requirements	PT-31XL		120l/min at 5.5 bar
Dimensions of PCM-500i	Length Height Width		490mm 452mm** 218mm
Weight (less torch, work cable)			23 kg

\* Duty cycle is based on a 10-minute period; therefore, a 40% duty cycle means the machine may operate for 4 minutes with a cool down period of 6 minutes; a 60% duty cycle means the machine may operate for 6 minutes with a cool down period of 4 minutes; a 100% duty cycle means the machine may operate continuously.

\*\* Includes 56 mm high handle.

## 2.1 GENERAL

### ! CAUTION

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.

### ! WARNING

Be sure that the wall disconnect switch or wall circuit breaker is open before attempting any inspection or work inside of the PCM-500i.

## 2.2 INSPECTION AND CLEANING

Frequent inspection and cleaning of the PCM-500i is recommended for safety and proper operation. Some suggestions for inspecting and cleaning are as follows:

- A. Check work cable to workpiece connection.
- B. Check safety earth ground at workpiece and at power source chassis.
- C. Check heat shield on torch. It should be replaced if damaged.
- D. Check the torch electrode and cutting nozzle for wear on a daily basis. Remove spatter or replace if necessary.
- E. Make sure cable and hoses are not damaged or kinked.
- F. Make sure all fittings and ground connections are tight.

### ! CAUTION

Water or oil occasionally accumulates in compressed air lines. Be sure to direct the first blast of air away from the equipment to avoid damage to the PCM-500i.

- H. With all input power disconnected, and wearing proper eye and face protection, blow out the inside of the PCM-500i using low-pressure dry compressed air.

## 2.3 FLOW SWITCH (FIGURE 2-1)

When excessive contamination is found in the air, the flow switch (FS) should be removed, disassembled and cleaned as follows:

- A. Ensure the system is shut down and there is no trapped air under pressure in the piping.
- B. Remove the piston plug.
- C. Remove the spring (FS-4 only). Use care when handling spring to prevent distortion.
- D. Remove the piston.
- E. Clean all parts with cleaning agent.

**NOTE**

Ensure cleaning agent does not contain solvents which can degrade polysulfone. Warm water and detergent is recommended for cleaning. Allow all parts to dry thoroughly before reassembly.

Reassemble the flow switch in reverse order.

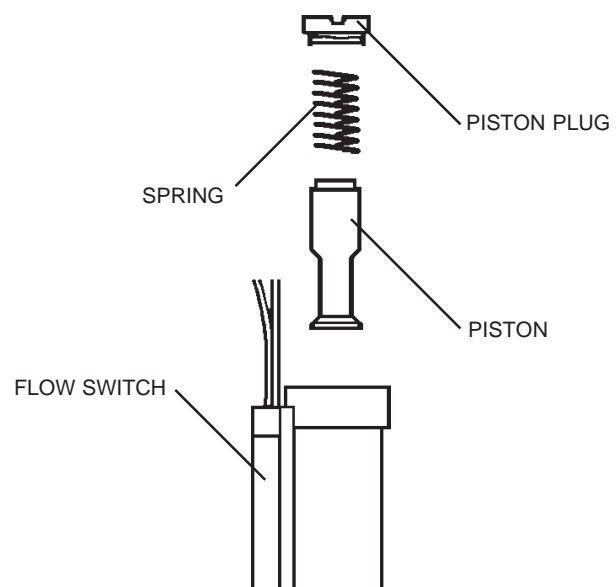


Figure 2-1. Disassembly / Assembly of Flow Switch

## 3.1 TROUBLESHOOTING

**WARNING**

**ELECTRIC SHOCK CAN KILL!** Be sure that all primary power to the machine has been externally disconnected. Open the line (wall) disconnect switch or circuit breaker before attempting inspection or work inside of the power source.

Check the problem against the symptoms in the following troubleshooting guide. The remedy may be quite simple. If the cause cannot be quickly located, shut off the input power, open up the unit, and perform a simple visual inspection of all the components and wiring. Check for secure terminal connections, loose or burned wiring or components, bulged or leaking capacitors, or any other sign of damage or discoloration.

The cause of control malfunctions can be found by

referring to the sequence of operations and electrical schematic diagram (Figure 3-1) and checking the various components. A volt-ohmmeter will be necessary for some of these checks.

**WARNING**

**Voltages in plasma cutting equipment are high enough to cause serious injury or possibly death. Be particularly careful around equipment when the covers are removed.**

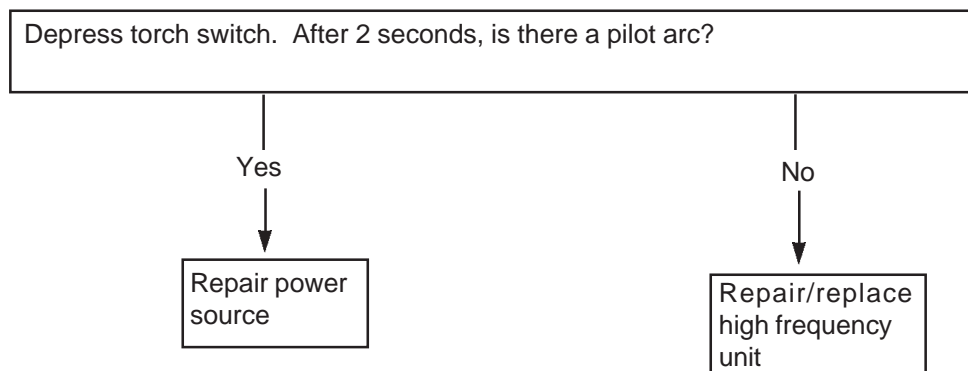
**NOTE**

Before checking voltages in the circuit, disconnect the power from the high frequency generator to avoid damaging your voltmeter.

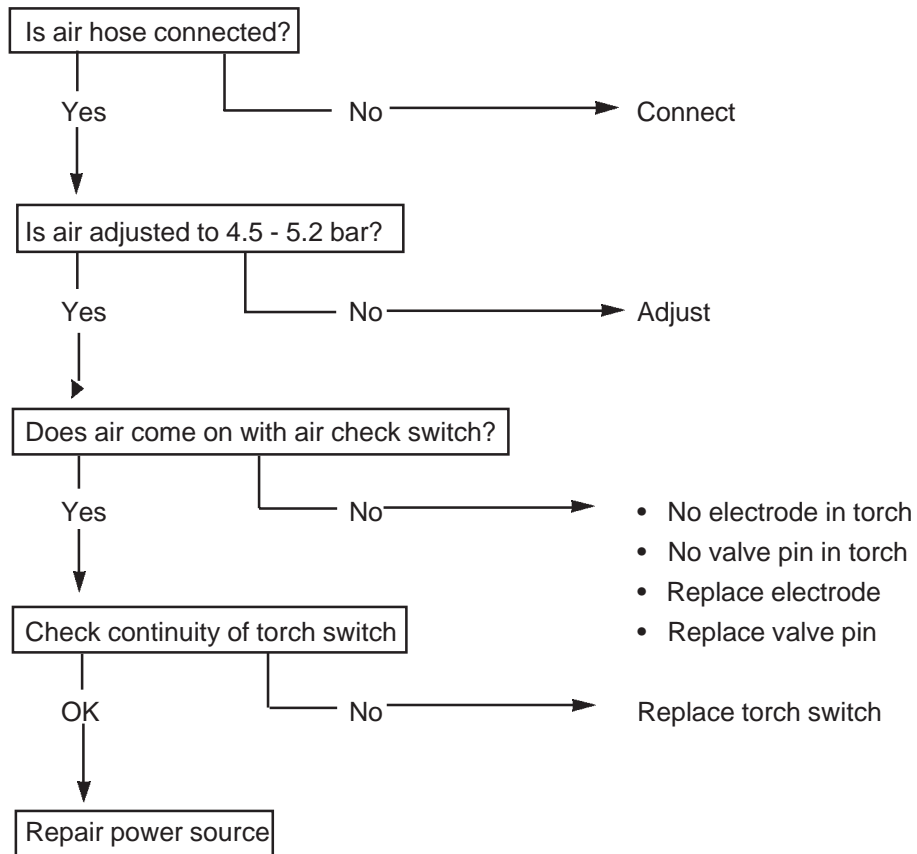
## 3.2 TROUBLESHOOTING GUIDE

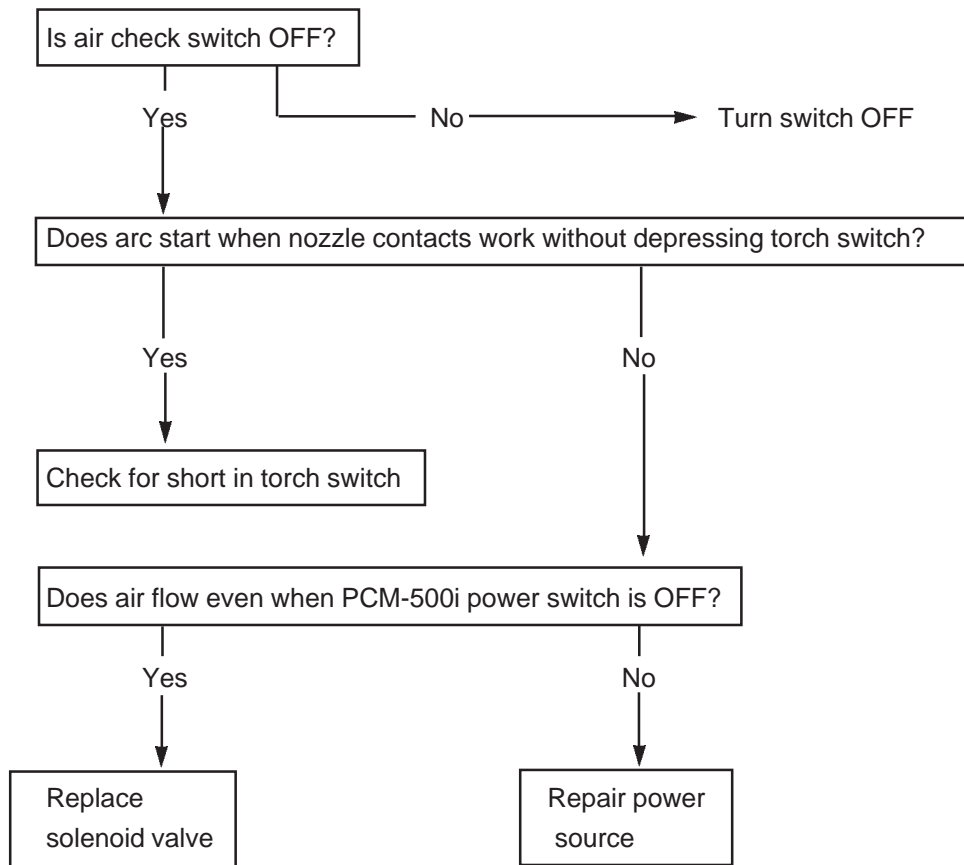
**A. Difficult Starting.**

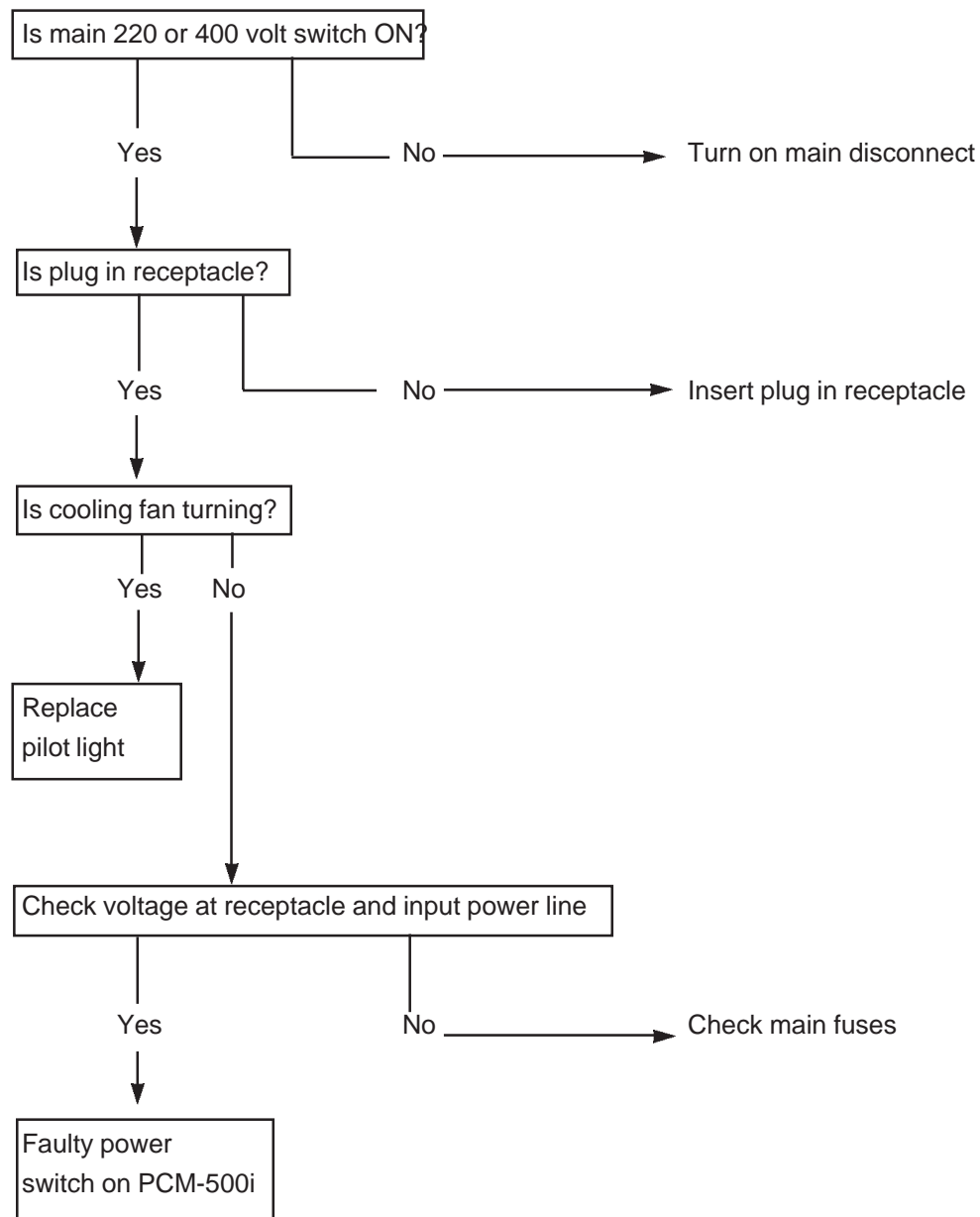
- Change electrode
- Change nozzle
- Check for good, clean connection of work lead to workpiece
- Check air pressure (4.5 -5.2 bar)
- Check torch power cable for continuity



## B. No Air

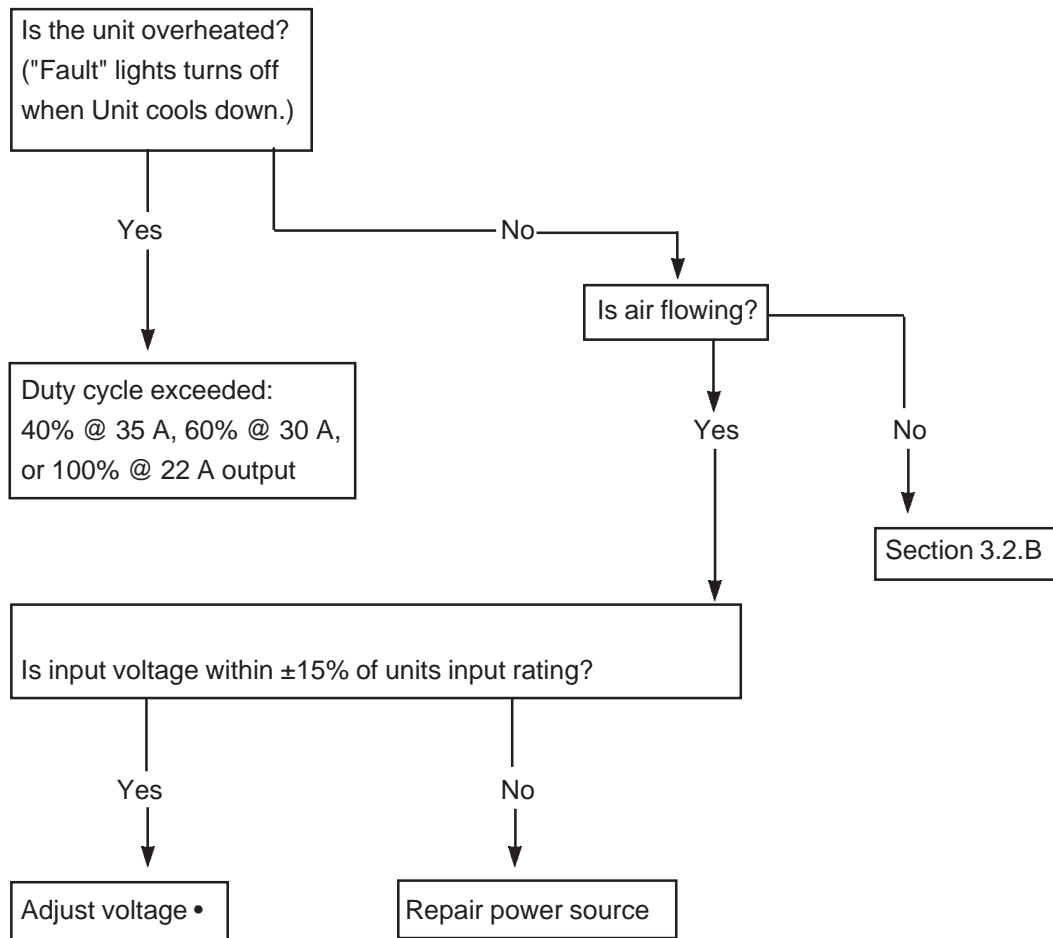


**C. Air does not shut off**

**D. White "Power" light not energized.**



## E. Amber "FAULT" light ON.

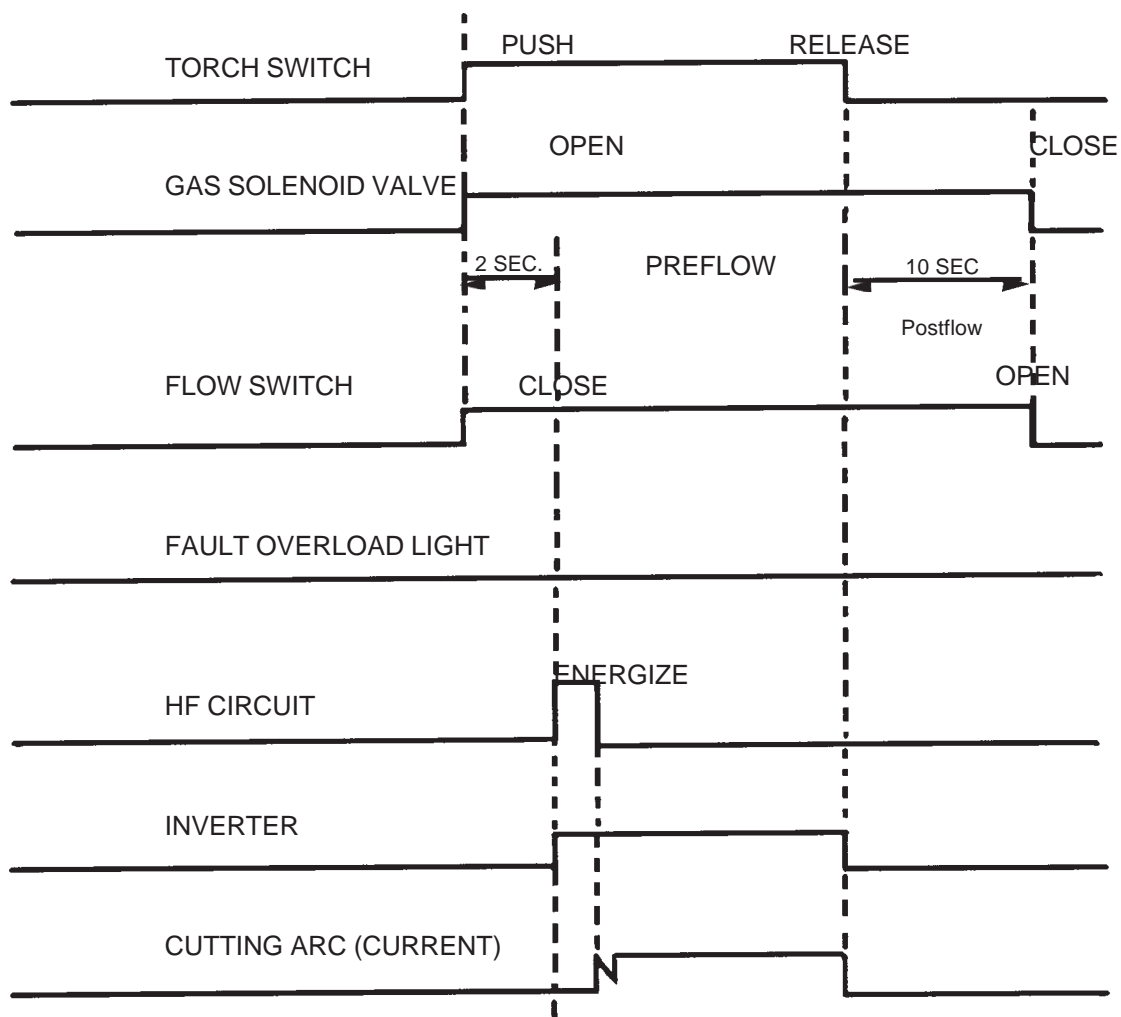


- Fault light will energize if input voltage goes below or above  $\pm 15\%$  of units input rating. The light will not turn OFF even when correct voltage is restored. Reset by placing PCM-500i power switch OFF and then ON again.

NOTE: When in LOCK-IN mode, the FAULT light will turn on during second "trigger". This does not affect performance. Turn off.

## 3.3 SEQUENCE OF OPERATION

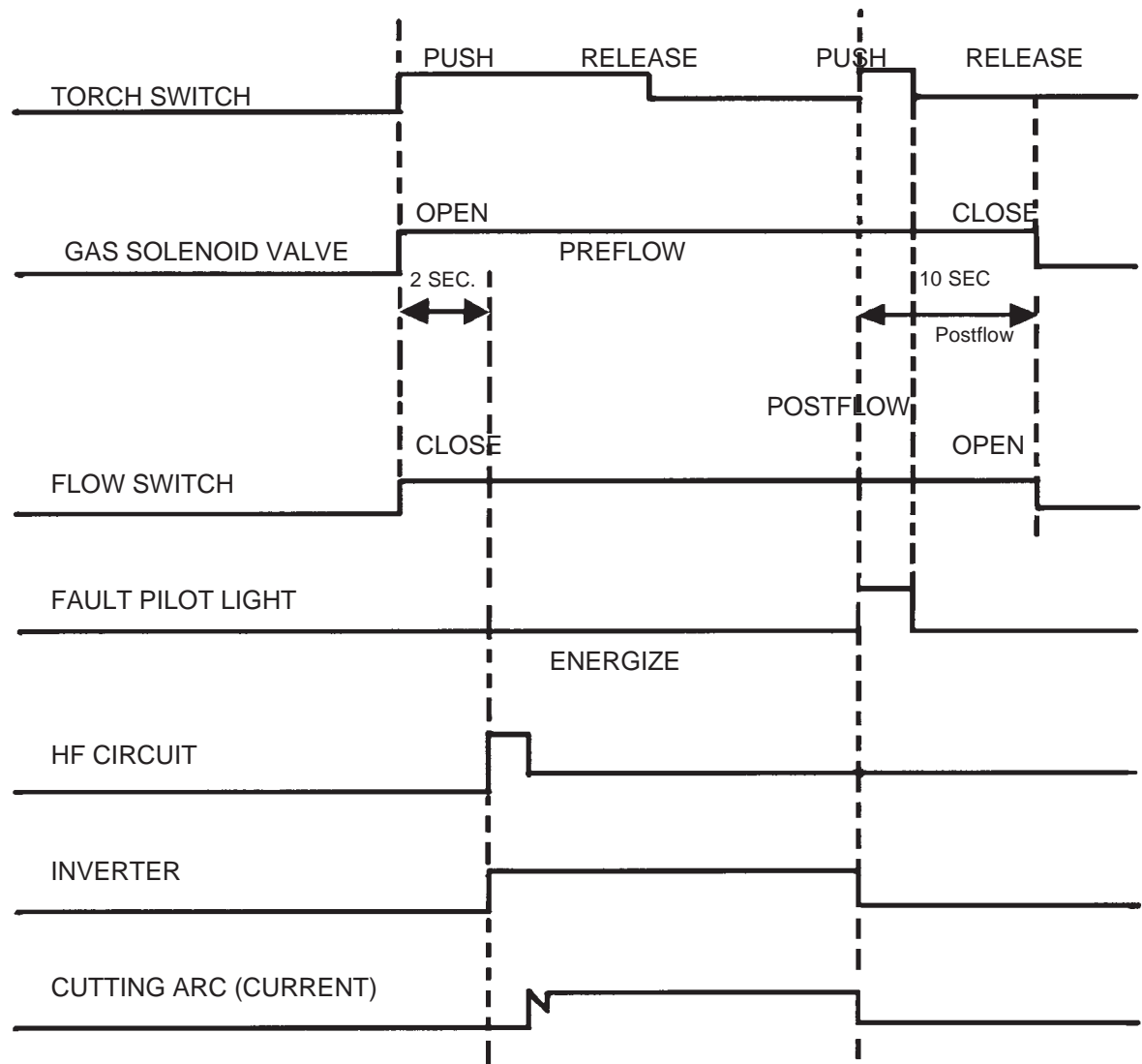
## A. LOCK-IN "OFF" position



## NOTES:

1. When the torch switch is pushed during postflow period, the postflow and preflow times are canceled, and the HF is energized immediately.
2. When the amber fault pilot light comes on, cutting operation should be stopped. The postflow time starts from the moment the torch switch is released.

## B. LOCK-IN "ON" position



## NOTES:

1. When the torch switch is pushed during postflow period, the postflow and preflow times are canceled, and the HF is energized immediately.
2. When the amber fault pilot light comes on, cutting operation should be stopped. The postflow time starts from the moment the torch switch is released.
3. FAULT pilot light is on during second "turn-off" trigger only. This does not affect performance in any way.

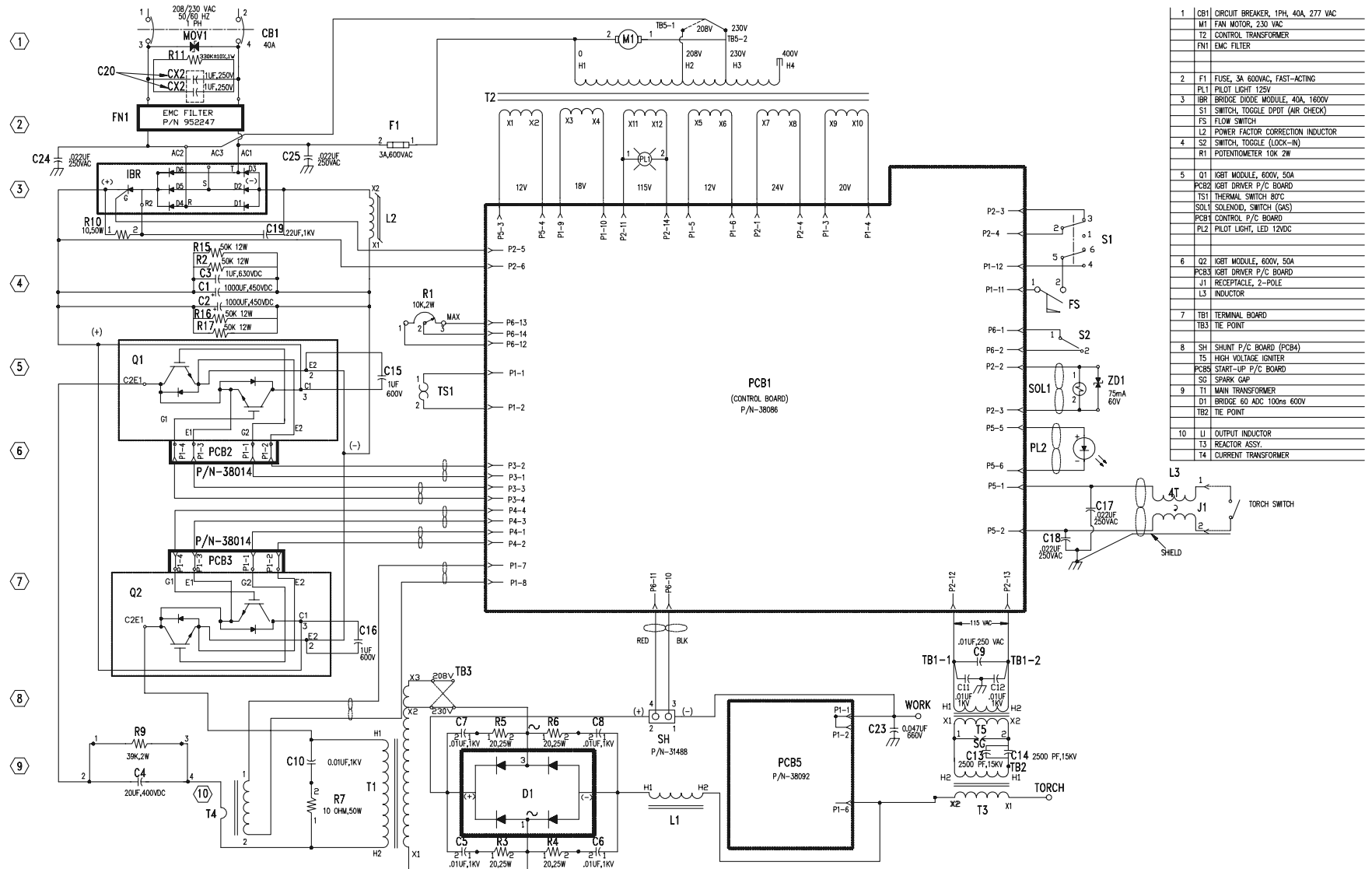


Figure 3-1. Schematic Diagram PCM-500i, 220 Vac, 50/60 Hz, 1-Phase

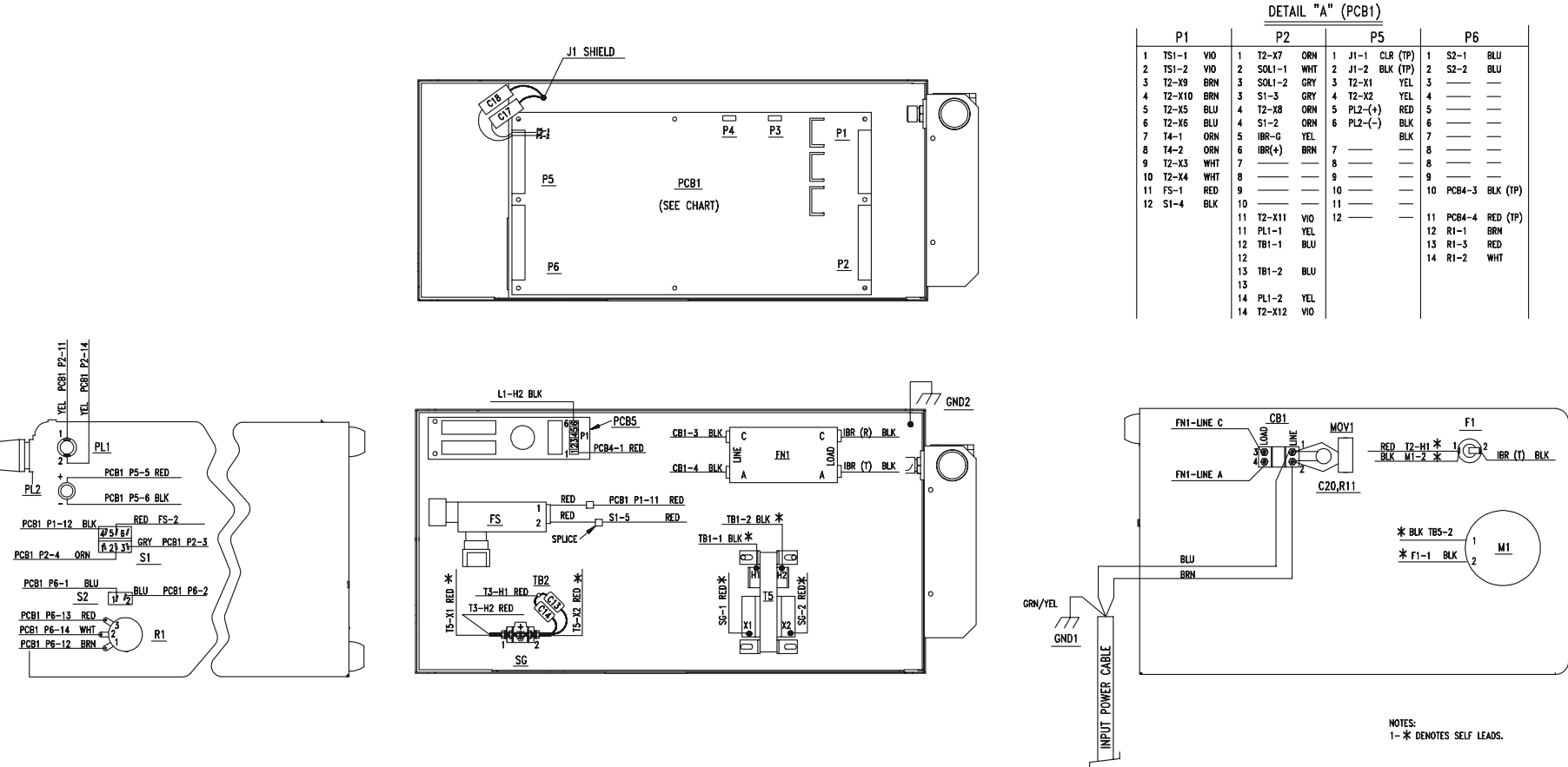


Figure 3-2. Wiring Diagram - PCM-500i 220 Vac, 50/60 Hz, 1-Phase (Sheet 1 of 2)

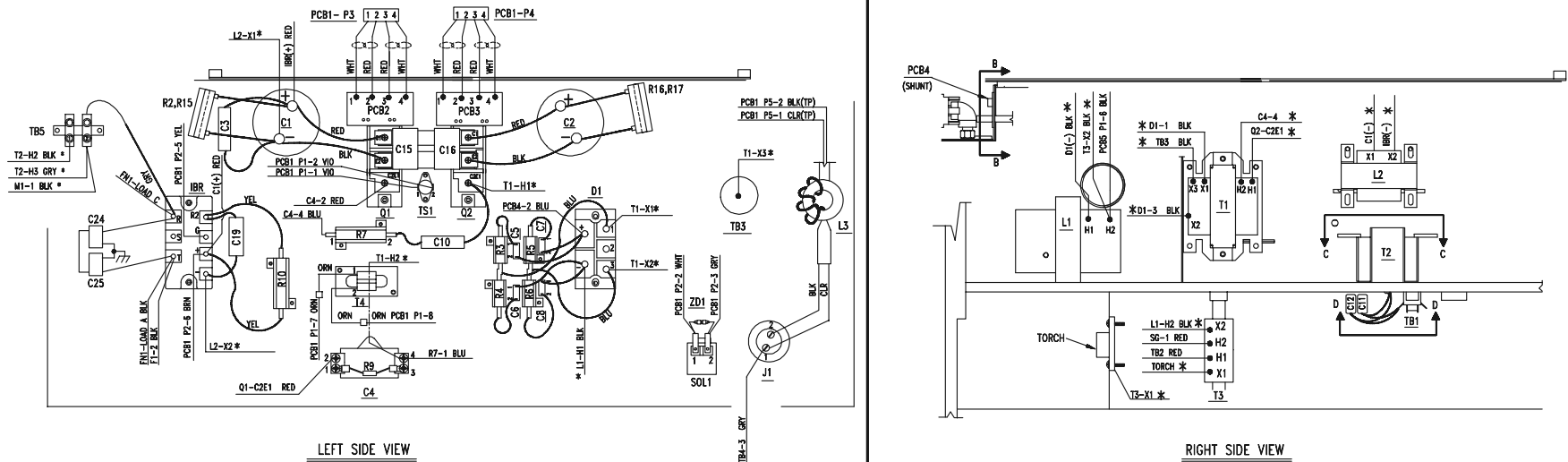
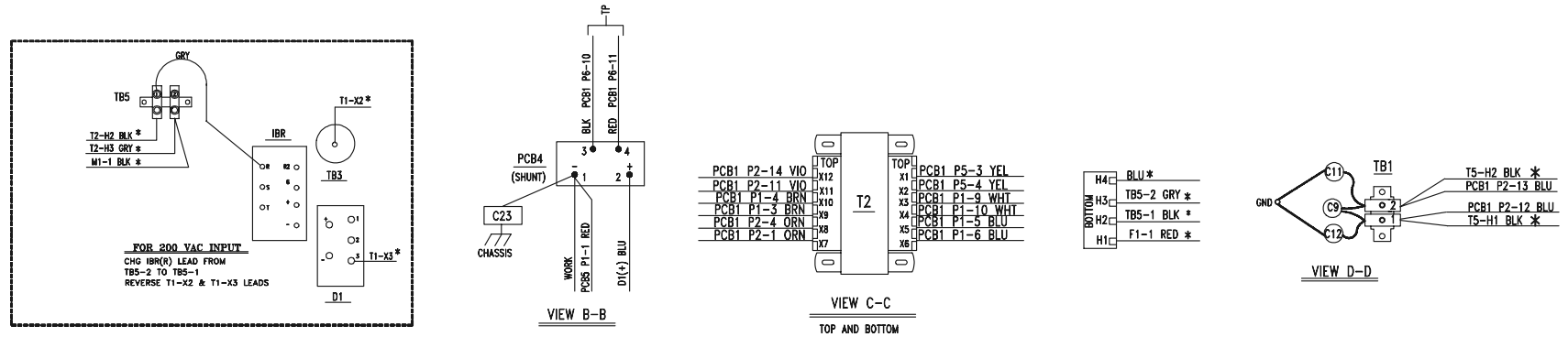


Figure 3-2. Wiring Diagram - PCM-500i 220 Vac, 50/60 Hz, 1-Phase (Sheet 2 of 2)

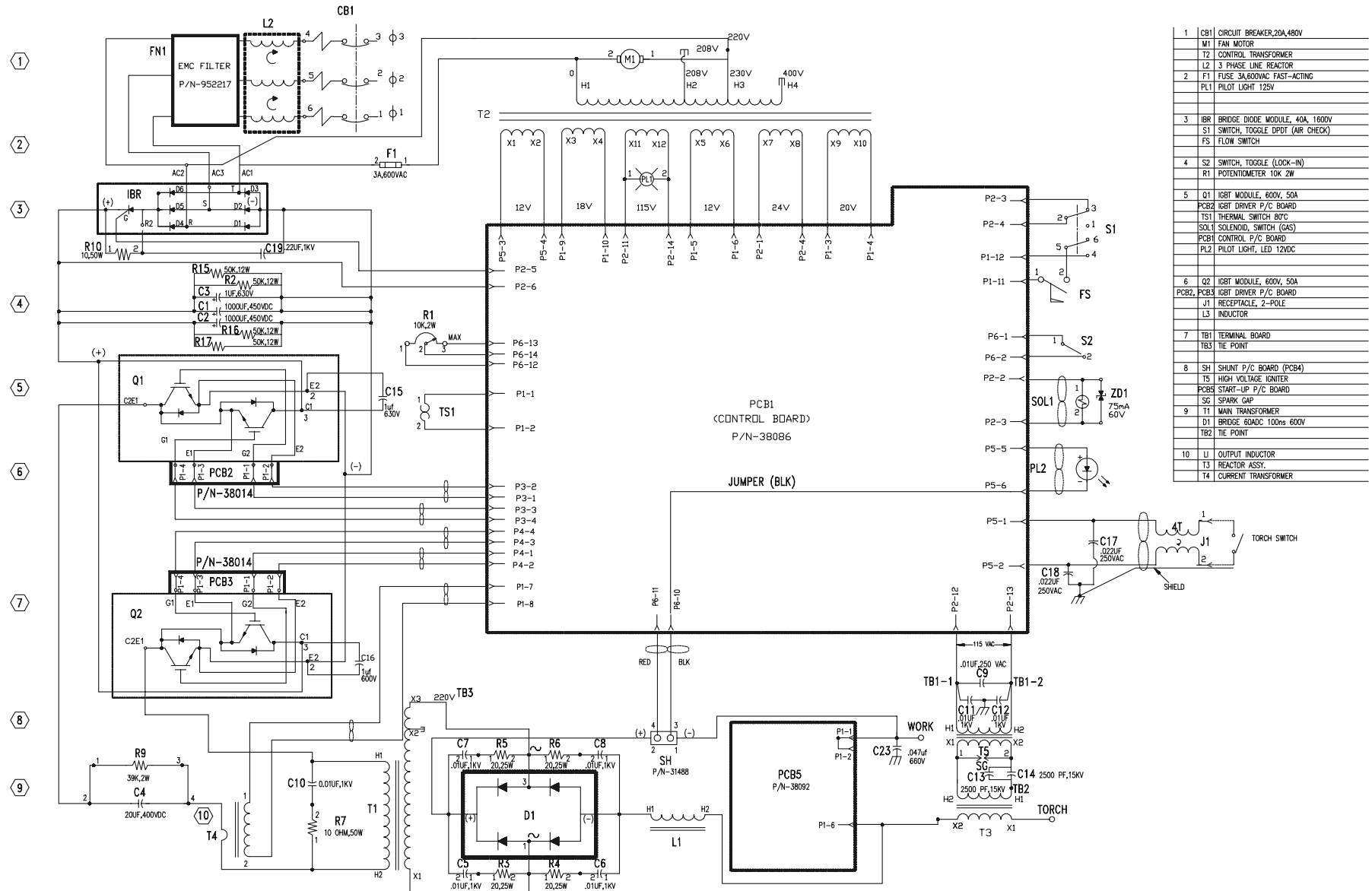
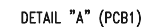
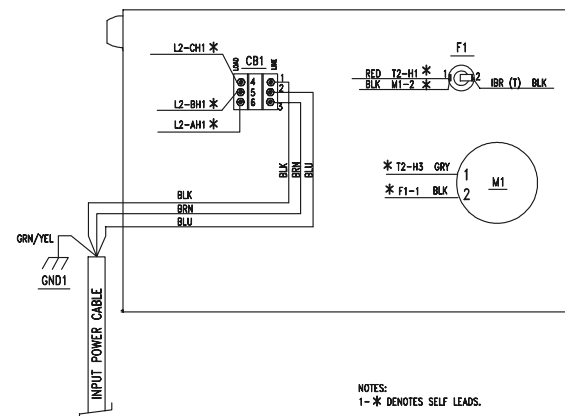


Figure 3-3. Schematic Diagram - PCM-500i 220 Vac, 50/60 Hz, 3-Phase



P1			P2		P5			P6				
1	TS1-1	VIO	1	TQ-1	ORN	1	J1-1	CLR (TP)	1	SZ-1	BLU	
2	TS1-2	VIO	2	SZ1-1	WHT	2	J1-2	BLK (TP)	2	SZ-2	BLU	
3	T2-19	BRN	3	SQ1-2	GRY	3	T2-X1	YEL	3			
4	T2-110	BRN	3	S1-3	GRY	4	T2-X2	YEL	4			
5	T2-135	BLU	4	T2-X8	GRN	5	PL2-(+)	RED	5			
6	T2-136	BLU	5	S1-2	GRN	6	PL2-(+)	BLK	6			
7	T4-1	ORN	5	BRG-6	YEL	7	PCB1: PG-10DLK		7			
8	T4-2	ORN	6	BR(+)	BRN	7			8			
9	T2-X3	WHT	7			8			8			
10	T2-X4	WHT	8			9			9			
11	FS-1	RED	9			10			10	PCB4-3	BLK (TP)	
12	S1-4	BLK	10			11			11	PCB1 P5-6	BLU	
			11	T2-X11	VIO	12			12	PCB4-4	RED (TP)	
			12	PL1-1	YEL					12	R1-1	BRN
			12	TB1-1	BLU					13	R1-3	RED
			13							14	R1-2	WHT
			13	TB1-2	BLU							
			14	PL1-2	YEL							
			14	T2-X12	VIO							



**Figure 3-4. Wiring Diagram - PCM-500i 220 Vac, 50/60 Hz, 3-Phase (Sheet 1 of 2)**



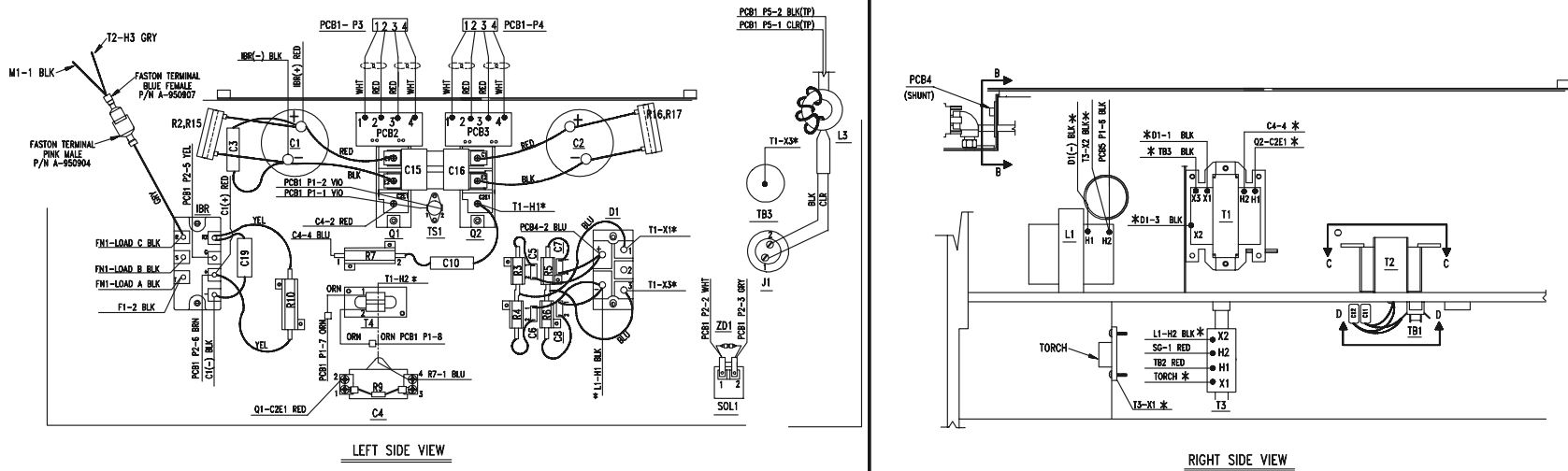
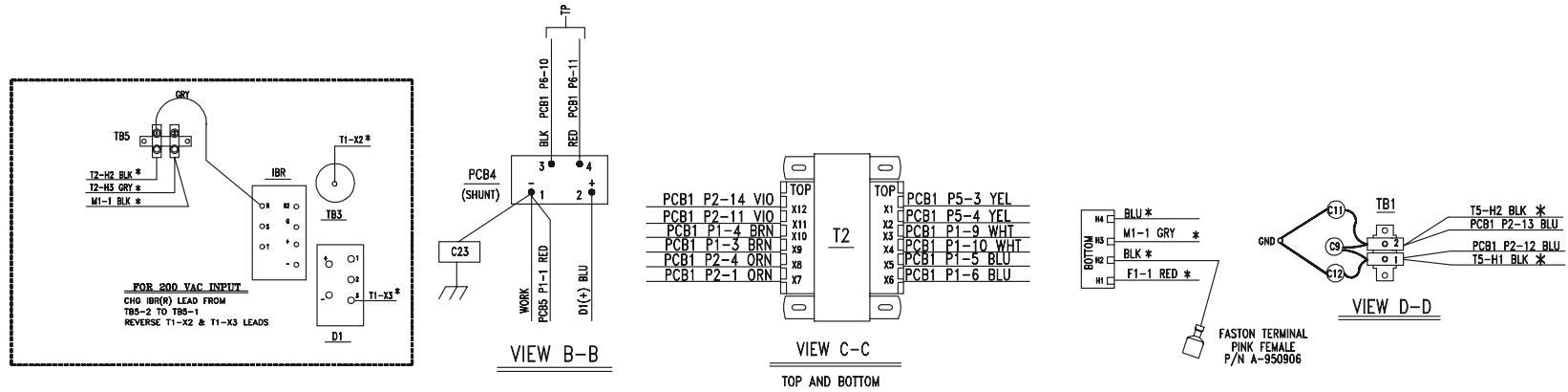


Figure 3-4. Wiring Diagram - PCM-500i 220 Vac, 50/60 Hz, 3-Phase (Sheet 2 of 2)

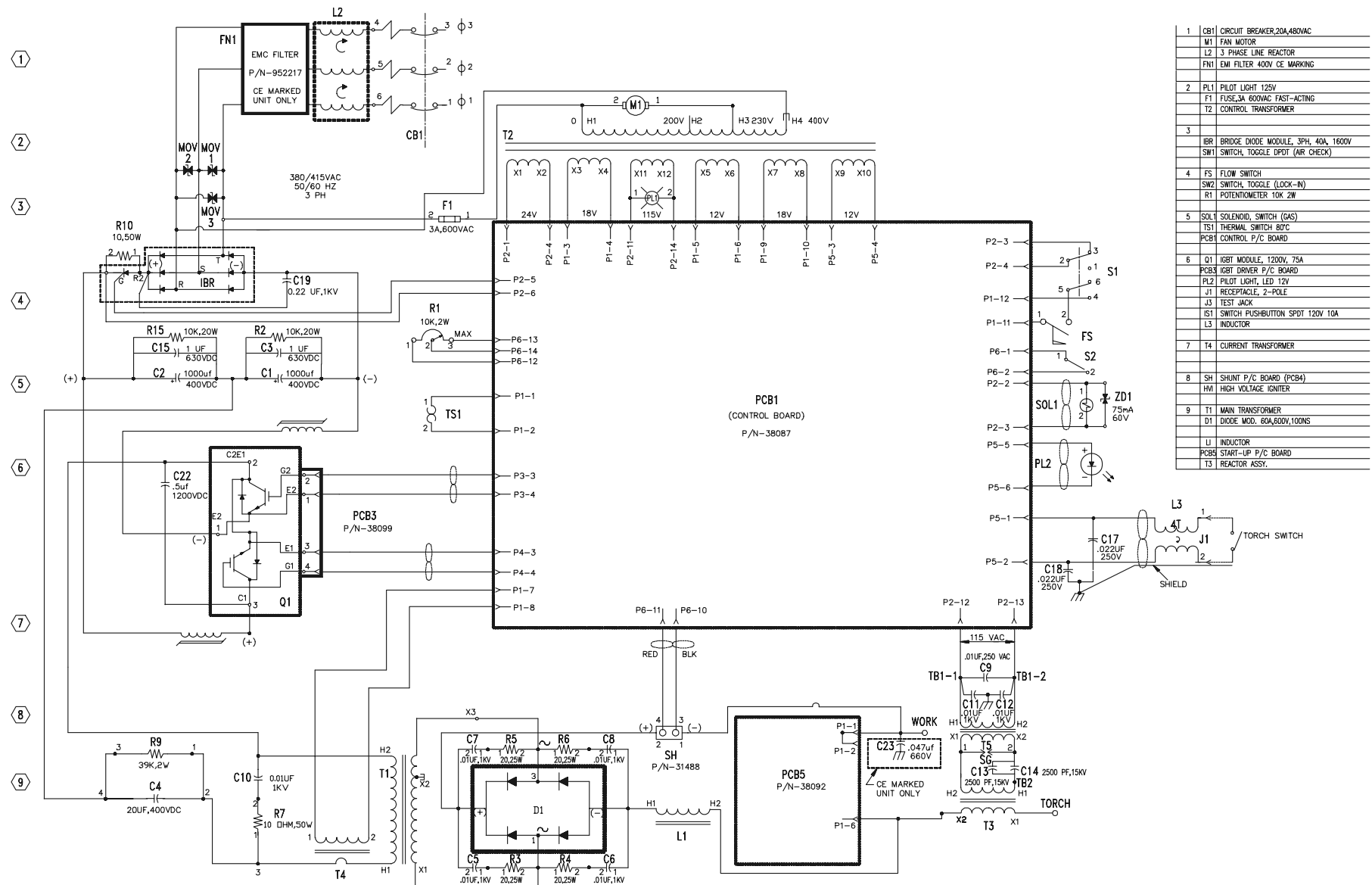
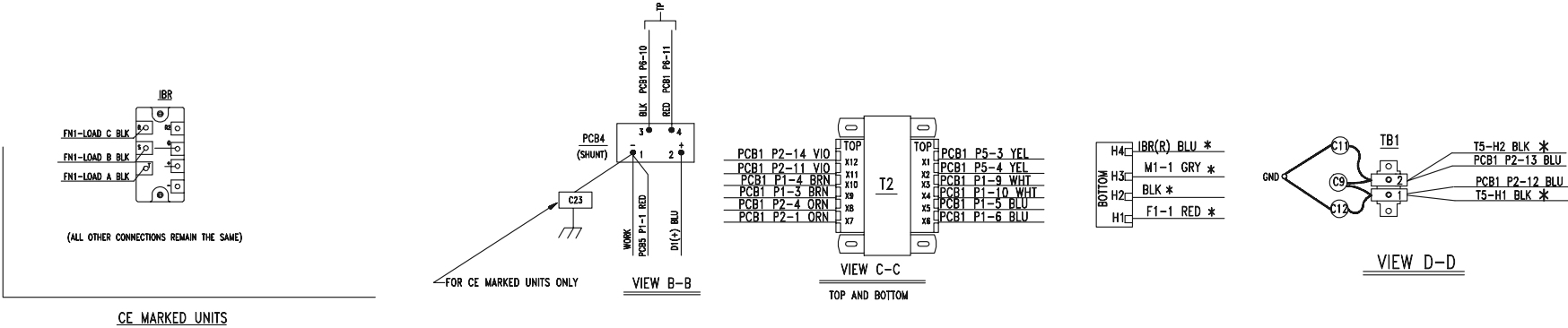


Figure 3-5. Schematic Diagram - PCM-500i 380/415 Vac, 50/60 Hz, 3-Phase





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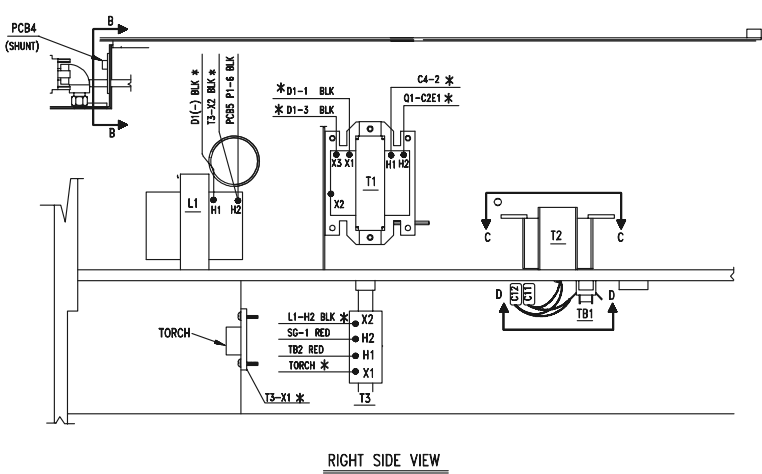
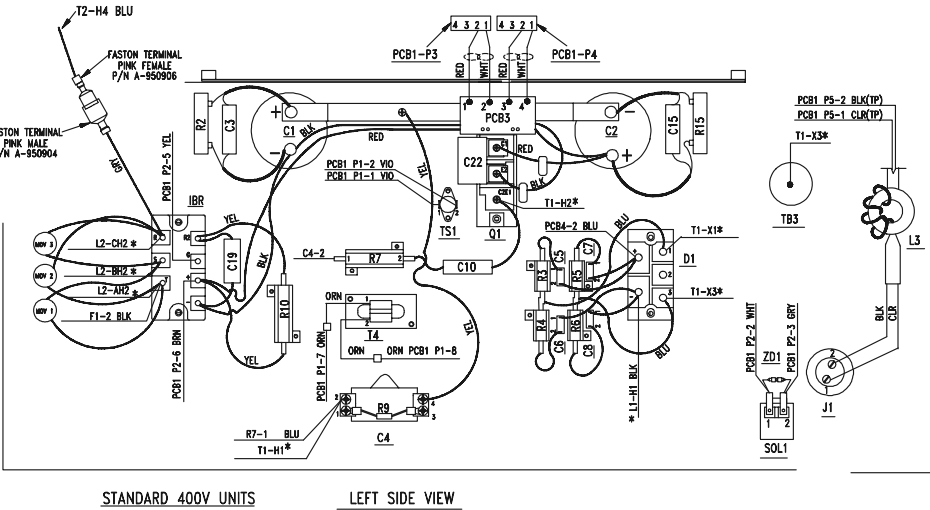


Figure 3-6. Wiring Diagram - PCM-500i 380/415 Vac, 50/60 Hz, 3-Phase (Sheet 2 of 2)

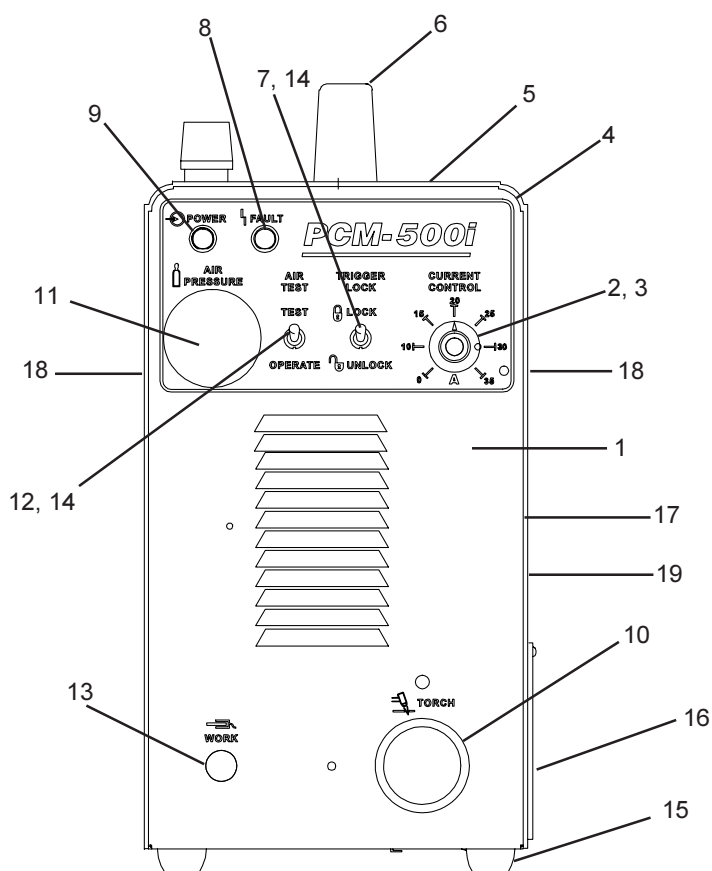
### **4.1 GENERAL**

Replacement Parts are illustrated on the following figures. When ordering replacement parts, order by part number and part name, as illustrated on the figure.

Always provide the series or serial number of the unit on which the parts will be used. The serial number is stamped on the unit nameplate.

### **4.2 ORDERING**

To assure proper operation, it is recommended that only genuine ESAB parts and products be used with this equipment. The use of non-ESAB parts may void your warranty.



**Figure 4-1. Front View, PCM-500i**

ITEM NO.	QTY. REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
1	1	558000590	CHASSIS	R1
2	1	558000372	POTENTIOMETER 10K 2W	
3	1	558000373	KNOB	
4	1	558000591	COVER TOP	
5	1	558000562	WARNING LABEL	
6	1	558000592	HANDLE (Screws and Lockwashers included)	
7	1	558000385	SWITCH TOGGLE DPDT 2POS 15A	S1
8	1	558000384	LAMP, WHITE	PL2
9	1	558000383	LAMP, YELLOW	PL1
10	2	558000593	GROMMET 1.5" ID	S2
11	1	558000594	GAUGE PRESSURE	
12	1	558000698	SWITCH TOGGLE SPST 2 POS 15A	
13	1	558000178	STRAIN RELIEF	
14	2	558000596	SWITCH SEAL	
15	4	558000552	FOOT	
16	1	558000597	ACCESS DOOR	
17	1	558000536	WARNING LABEL	
18	2	558000132	LABEL	
19	1	558000599	WARNING LABEL, HI-VOLTAGE	

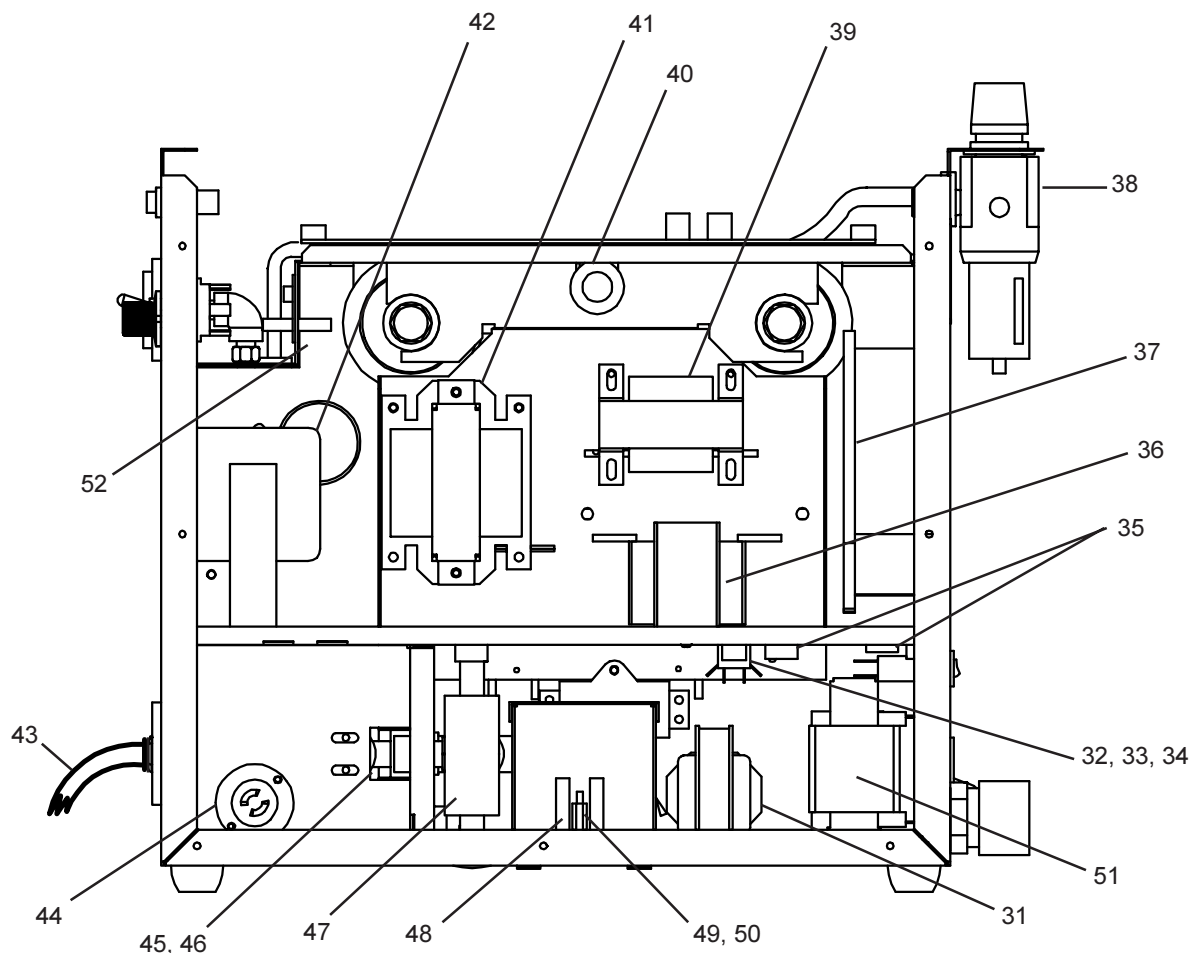
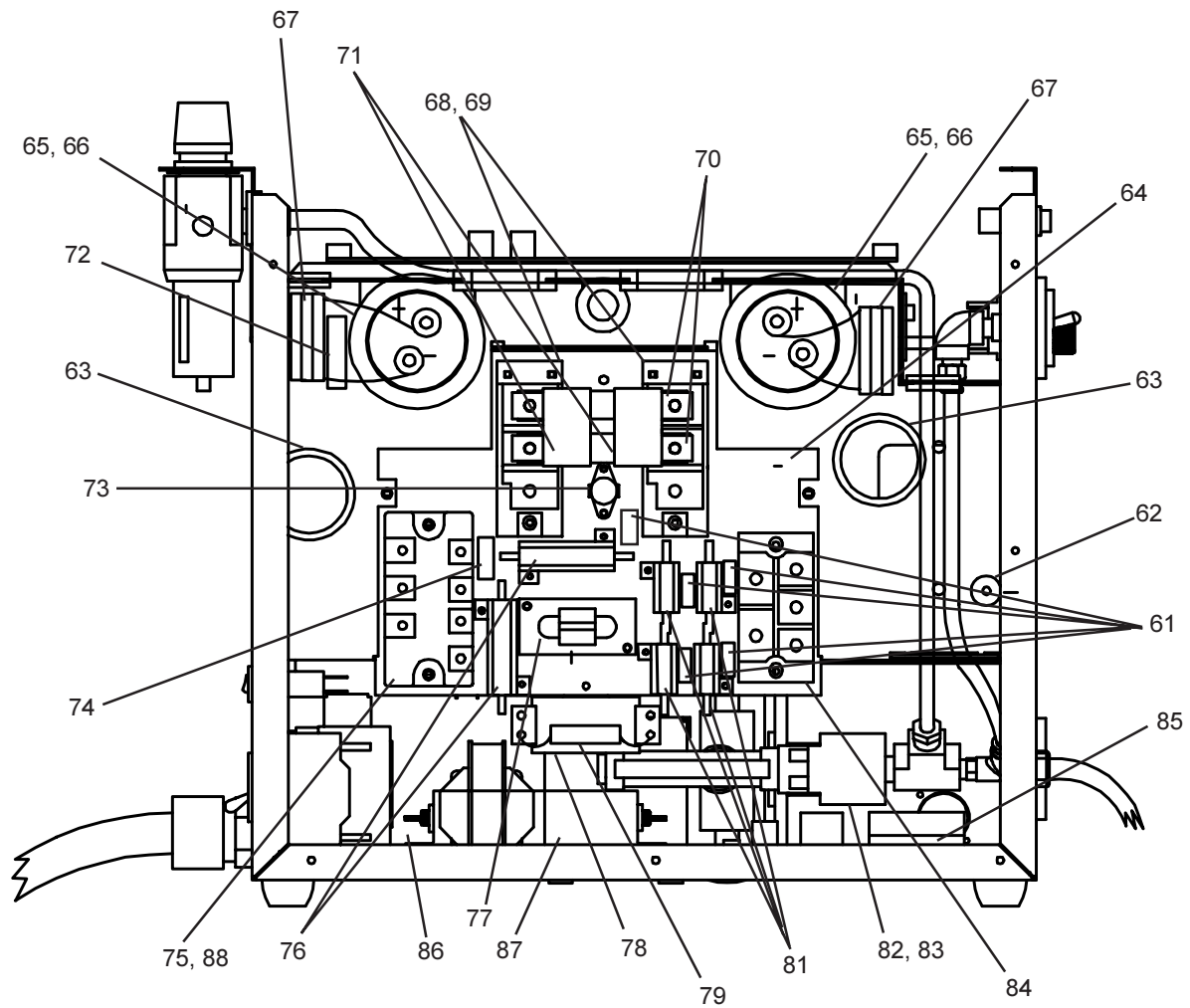


Figure 4-2. Right Side View, PCM-500i

ITEM NO.	QTY. REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
31	1	558000467	HI VOLTAGE TRANSFORMER	T5
32	1	558000600	TERMINAL BLOCK 2 POS	TB1
33	1	558000601	CAPACITOR 0.1 $\mu$ f 250 VAC	C9
34	2	558000602	CAPACITOR 0.01 $\mu$ f 1 KV	C11, C12
35	2	558000603	SNAP BUSHING	
36	1	558000604	CONTROL TRANSFORMER	T2
37	1	558000388	FAN AC AXIAL	M1
38	1	558000605	AIR LINE FILTER REGULATOR	
39	1	558000606	INDUCTOR POWER FACTOR CORRECTION	L2
40	1	558000584	GROMMET -.63" ID	
41	1	558000607	MAIN TRANSFORMER	T1
42	1	558000406	INDUCTOR OUTPUT	L1
43	1	558000608	WORK CABLE 25 FT includes CLAMP 13730862	
44	1	558000380	RECEPTACLE, TWIST LOCK MIDGET	J1
45	1	558000609	OUTPUT TERMINAL BOARD	
46	1	558000523	ADAPTOR B/A 1/4 NPTM BULKHEAD	
47	1	558000403	REACTOR HI FREQ	T3
48	1	558000610	SPARK GAP ASS'Y includes (2) POINT 32931	SG
49	1		STANDOFF	TB2
50	2	558000611	CAPACITOR 2500 $\mu$ f 15 KV	C13, C14
51	1	558000612	3%, 3-PH LINE REACTOR, 8A/PH (400 V)	L2
	1	558000613	1.5%, 3-PH LINE REACTOR, 12A/PH (220 V/3 PH)	L2
52*	1	558000521	CAPACITOR 0.047 $\mu$ f, 660 V	C23

\* Not shown. See Wiring Diagram for location.



**220 V, 1 Phase Power Source illustrated.**



Figure 4-3. Left Side View, PCM-500i

ITEM NO.	QTY. REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
61	5	558000405	CAPACITOR 0.01 $\mu$ F 1KV	C5, 6, 7, 8, 10
63	2		SNAP BUSHING	
64	1	558000614	HEATSINK	
65	2		GROMMET 2.12" ID	C1, C2
66	2	558000615	CAPACITOR 1000 $\mu$ f 400 VDC	
67	4	558000616	RESISTOR 50K 12W (220 V)	
	2	558000578	RESISTOR 10K 20W (400 V)	R2, R15
68	2	558000617	IGBT 50 A 600 V (PAD 951190) (220 V)	Q1, Q2
	1	558000618	DUAL MODULE IGBT 75 A 1200 V (includes PAD 951190) (400 V)	
69	2	558000494	PC BOARD IGBT DRIVER (220 V)	Q1 PCB2, PCB3
	1	558000619	PC BOARD IGBT DRIVER (400 V)	
70	2		BUSBAR (230 V)	C15, C16
	1		BUSBAR (400 V)	
71	2	558000556	CAPACITOR 1 $\mu$ f 600 VDC (220 V)	
	1	558000621	CAPACITOR .5 $\mu$ f 1200 VDC (400 V)	C22
72	1		CAPACITOR 1 $\mu$ f 630 VDC (220 V)	C3
	2		CAPACITOR 1 $\mu$ f 630 VDC (400 V)	C3, C15
73	1	558000709	THERMAL SWITCH D/T 176 15 A 120 V	TS1
74	1	558000622	CAPACITOR 0.22 $\mu$ f 1KV	C19
75	1	558000623	MODULE INPUT BRIDGE 50 A (includes PAD 951191)	IBR
76	2	558000400	RESISTOR 50 W 10 OHM (PAD 951194)	R7, R10
77	1	558000408	CURRENT TRANSFORMER	T4
78	1	558000469	CAPACITOR 20 $\mu$ f 400 VDC	C4
79	1	558000624	RESISTOR 39 K 2 W	R9
80	1	558000410	FLOW SWITCH 0.25 GPM SPST	FS
81	4	558000404	RESISTOR 20 OHM 25 W (PAD 951193)	R3, 4, 5, 6
82	1	558000409	SOLENOID VALVE 1/4 NPT 24 VAC	SOL1
83	1	558000625	ZENER DIODE 60 V 75 mA	ZD1
84	1	558000626	OUTPUT BRIDGE MODULE (includes PAD 951192)	D1
85	1	558000627	PC BOARD ASSY'S START UP (hidden)	PCB5
86	1		TERMINAL LUG GROUND (hidden)	GND1
87	1	558000628	EMI FILTER	FN1
88	3	558000629	VARISTOR METAL OXIDE 510 (400 V)	MOV 1, 2, 3

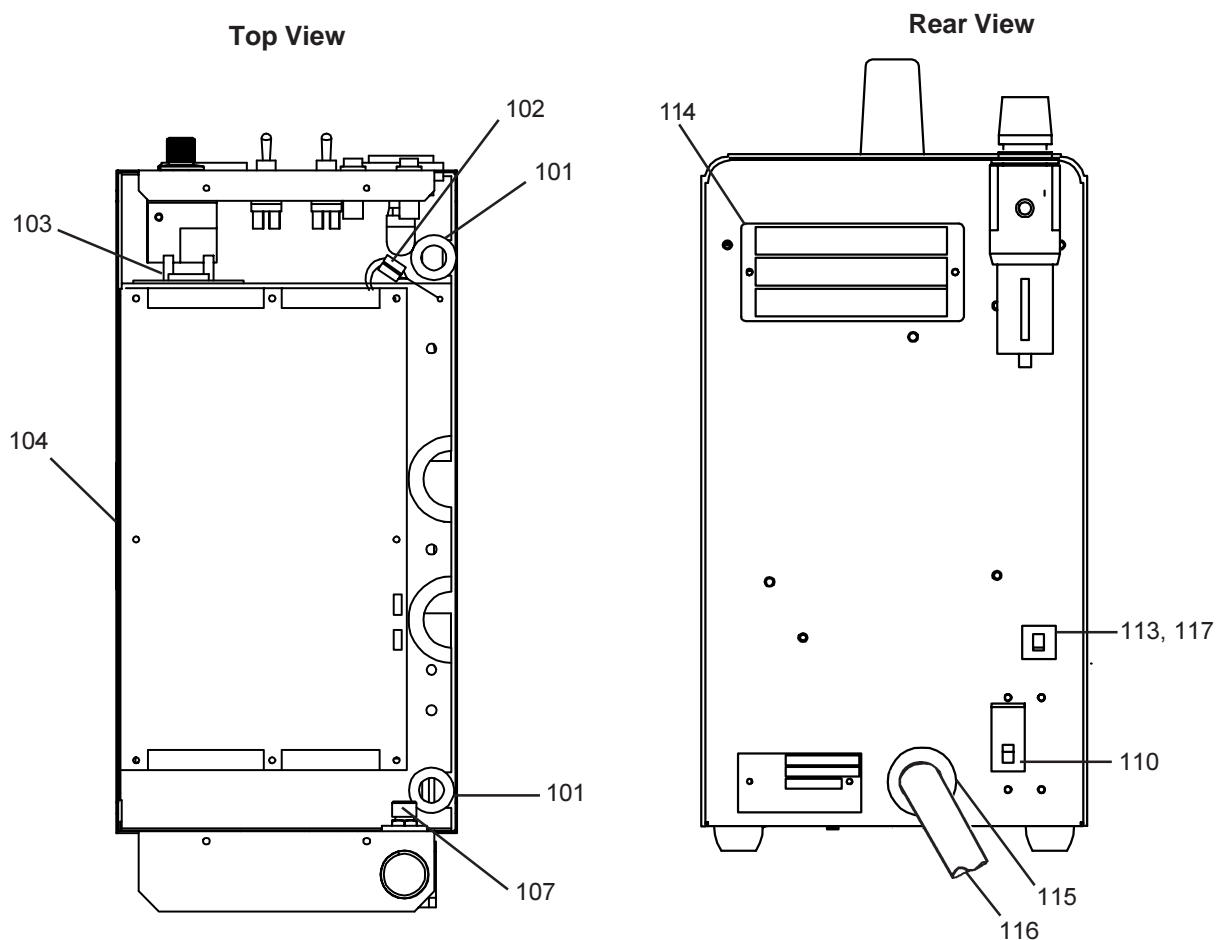


Figure 4-4. Top and Rear View, PCM-500i

ITEM NO.	QTY. REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
101	2	558000584	GROMMET 0.63 ID	
102	2	558000585	CAPACITOR 0.22 $\mu$ f 250 VAC	C17, C18
103	1	558000396	PC BOARD SHUNT	PCB4
104	1	558000586	PC BOARD ASS'Y CONTROL (220 V)	PCB1
	1	558000587	PC BOARD ASS'Y CONTROL (400 V)	PCB1
107	1	558000534	ADAPTOR, AIR-WATER	
110	1	558000588	CIRCUIT BREAKER 40 A (220 v, 1 ph)	CB1
	1	558000589	CIRCUIT BREAKER 20 A (3 PH)	CB1
113	1	558000686	FUSE 3A 600VAC FAST ACTING	F1
115	1	558000537	STRAIN RELIEF	
116	1	558000620	CABLE INPUT POWER, 10 FT	
117	1	558000516	FUSE HOLDER	



